O-05

Park Systems atomic force microscopes

S.V. Butiaikin

«Promenergolab» LLC, 107392, Moscow, Russia,
e-mail: svb@czl.ru

Park Systems is a global nanometrology equipment company focused on the development, production and sale of the atomic force microscopy systems. This equipment has incorporated the most advanced technology and more than 20 years' experience in this field.

Park Systems offers a wide number of AFMs that can be used for different jobs: research grade AFMs and industrial grade AFMs.

In both types of systems the same production technology and element base are used. The most popular and widespread are the research grade microscopes of the NX series. The flagships of this series are NX10 and NX20 AFMs (for analysis of small (up to 50 mm) and large (up to 200 mm) samples, respectively).

NX series AFM has unmatched accuracy, scanning speed and long service life of cantilevers which is especially important for modern tasks. These microscopes combine power, versatility and ease of use that is ideal for defects analysis and examining various samples.

The main distinguishing features of our AFM are:

- Crosstalk Elimination that removes background curvature and provides flat scan imaging in all size and conditions. So there is no need for post-processing
- True Non-Contact Mode that frees user from sample damage, minimizes costly tip degradation and prolongs high-resolution imaging
- True sample topography that allows record accurate heights of sample surface and frees from edge overshoot or piezo creep errors

Also high performance is ensured by combining a large number of high-precision elements in a single system:

- The conventional AFM use a piezotube - the bending motion of a piezotube introduces background curvature because you are moving in Z as you move in XY. Software flattening is required to correct the background curvature to a limited success. Park AFM utilizes two independent flexure scanners for sample and probe. XY scanner scans only sample and Z scanner scans only probe. The flexure scanners are Park's own design and make. They are developed and engineered for AFM scan
- The XY scanner comes with dual servo system. They are two pairs of symmetric, low-noise position sensors incorporated on each axis of the XY scanner. One pair of sensors corrects and compensates the non-linear and non-planar positional errors caused by the other pair of sensors. Dual servo is very much needed in order to retain a high orthogonality as the scan size and sample size become larger
- Minimized thermal drift - low thermal drift requires a careful mechanical design to reduce the undesired motion of the tip, relative to the sample. Designed to be thermally stable, the AFM body of Park NX10 and Park NX20 is optimized with thermally matched components and materials. A typical thermal drift rate is less than 0.15 nm/min for the lateral and 0.3 nm/min for the vertical
- High power optics consisting of objective lens with ultra-long working distance allows sample observation with unprecedented vision clarity. The long working distance of the objective lens is essential in enabling the direct on-axis view, the intuitive direct sample view from the top

Despite the complexity of the construction of these AFMs they are surprisingly easy to use even for an untrained user who does not have any knowledge in the field of AFM:

- Flexible and intuitive software has animated presentations that helps you prepare an AFM for measurement in just four clicks

- The system automatically approaches cantilever to the surface of a sample for the required distance – an operator should not be afraid that he can damage a sample or cantilever
- The unique head design of the crosstalk elimination allows a wide open side access for each sample and tip exchange. Hence, probe tip and sample exchange are just an easy snap by hand. Also the AFM head is easily inserted or removed by sliding along a dovetail rail. This locks the AFM head into its pre-aligned position with a positioning repeatability of a few microns, and automatically connects it to the control electronics
- Easy laser alignment - With our advanced pre-aligned cantilever holder, the laser beam is focused on the cantilever upon replacement. The natural on-axis top-down view allows the user to easily find the laser spot. Since the laser beam falls vertically on a cantilever, the laser spot moves intuitively and linearly along X and Y by rotating two positioning knobs. Hence, the laser is easy to position on PSPD

Park Systems has the most extensive range of advanced modes and options in the industry that allows you to equip the AFM in such a way that you can measure any properties that are necessary.

The most popular fields of research with the help of described AFMs are:

- Surface roughness measurement
- Conductive AFM - measures the conductivity across the sample regions
- Scanning capacitance microscopy

Technical support by highly qualified personnel on the user's side as well as online support ensures that you can always solve any emerging problem.